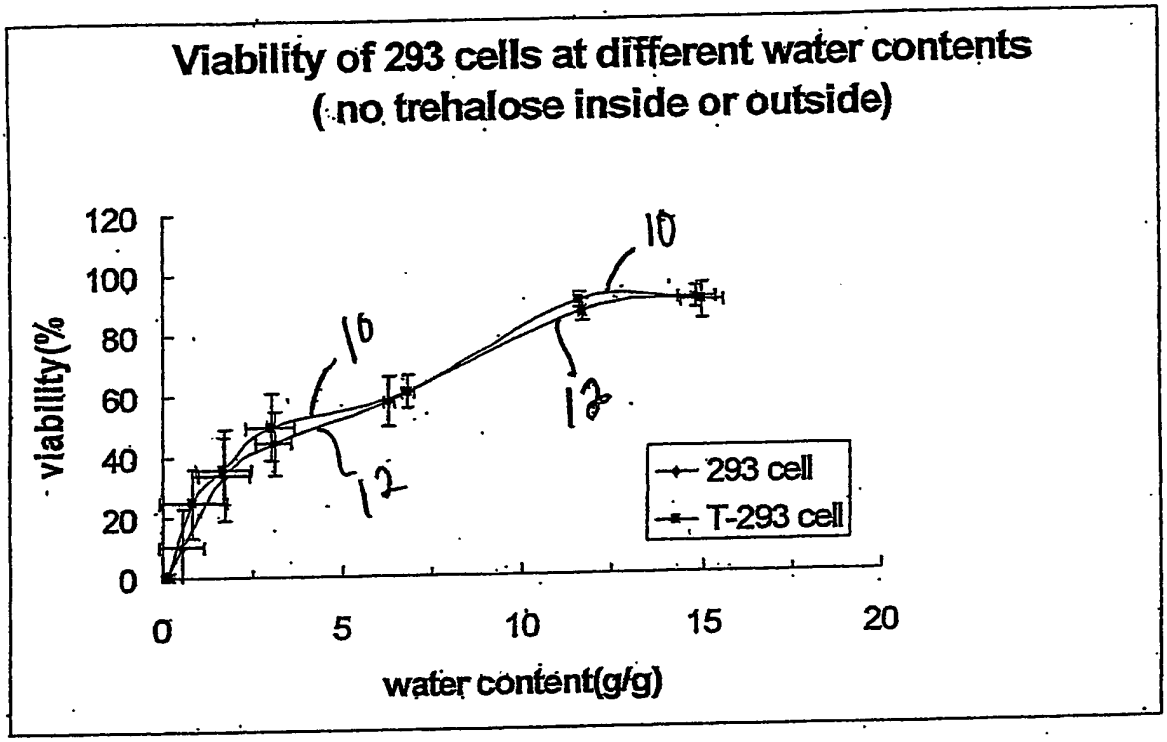
Fig. 1


Viability of 293 cells at different water contents
(no trehalose inside or outside)
viability(%
120
100
80
60
40
20
0
0
5
10
15
20
water content(g/g)
293 cell
T-293 cell
10
10
12
12

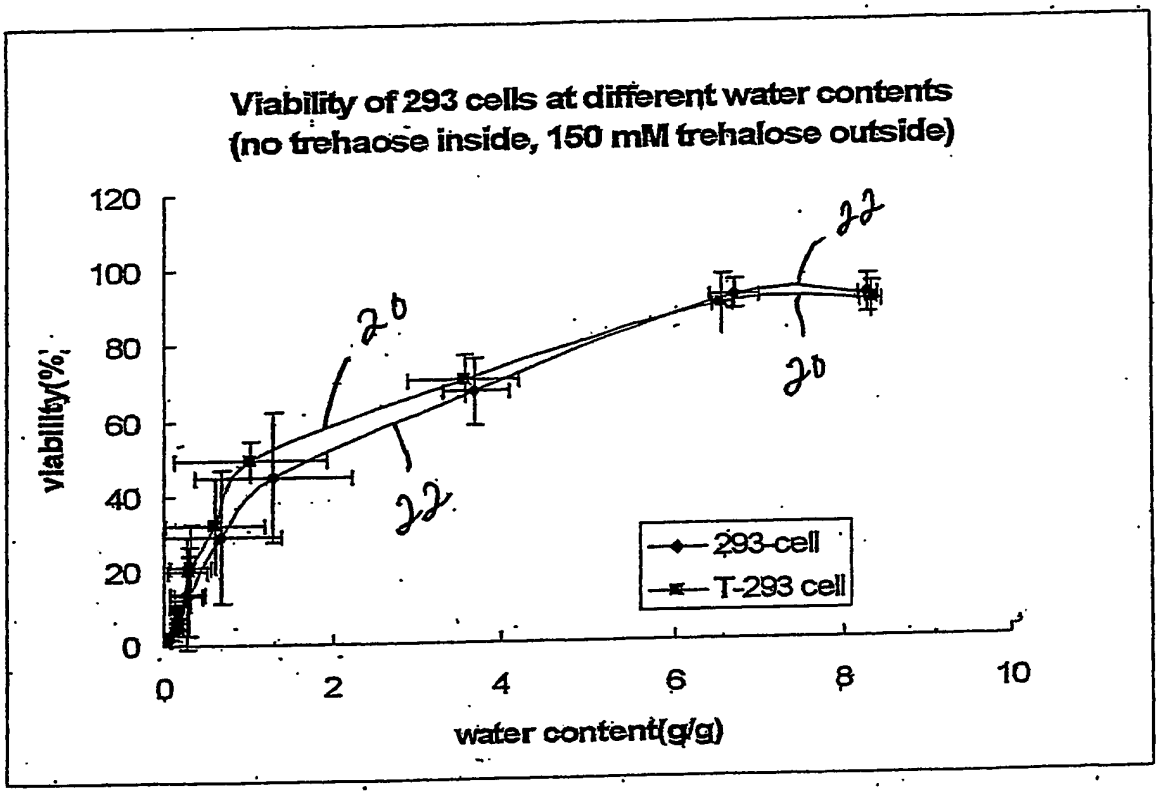

Viability of 293 cells at different water contents
(no trehaose inside, 150 mM trehalose outside)
viability(%)
120
100
80
60
40
20
0
0
2
4
6
8
10
water content(g/g)
293-cell
T-293 cell
20
22
20
22

Fig. 3

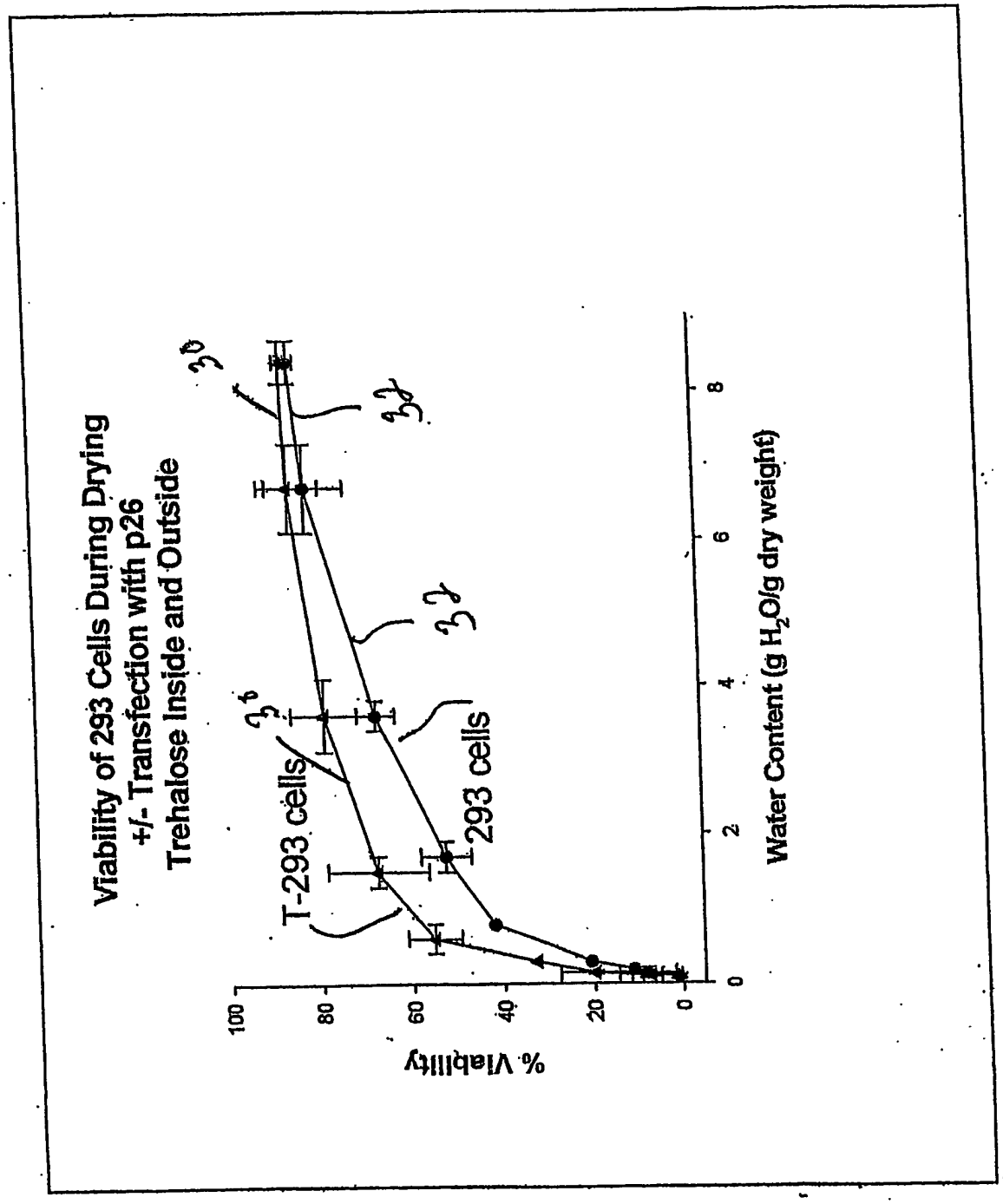

Viability of 293 Cells During Drying
+/- Transfection with p26
Trehalose Inside and Outside
% Viability
Water Content (g H2O/g dry weight)
T-293 cells
293 cells
100
80
60
40
20
0
0
2
4
6
8

Fig. 4

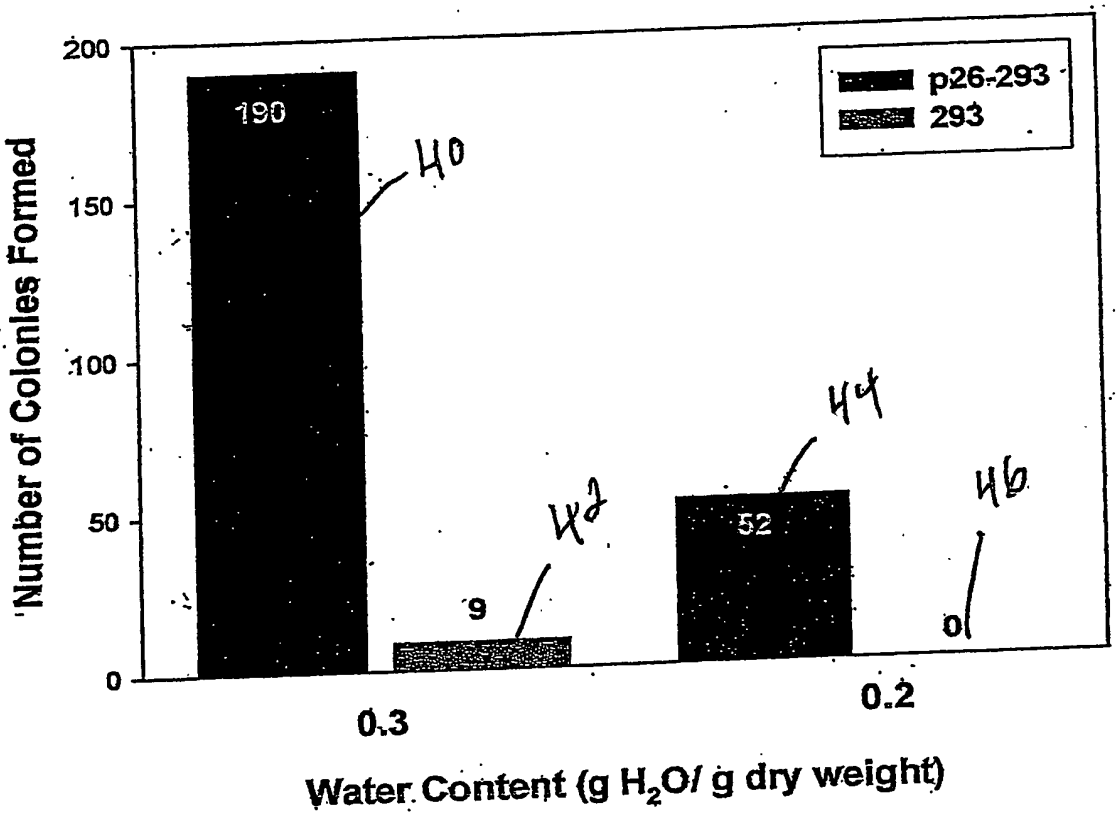


Fig. 5

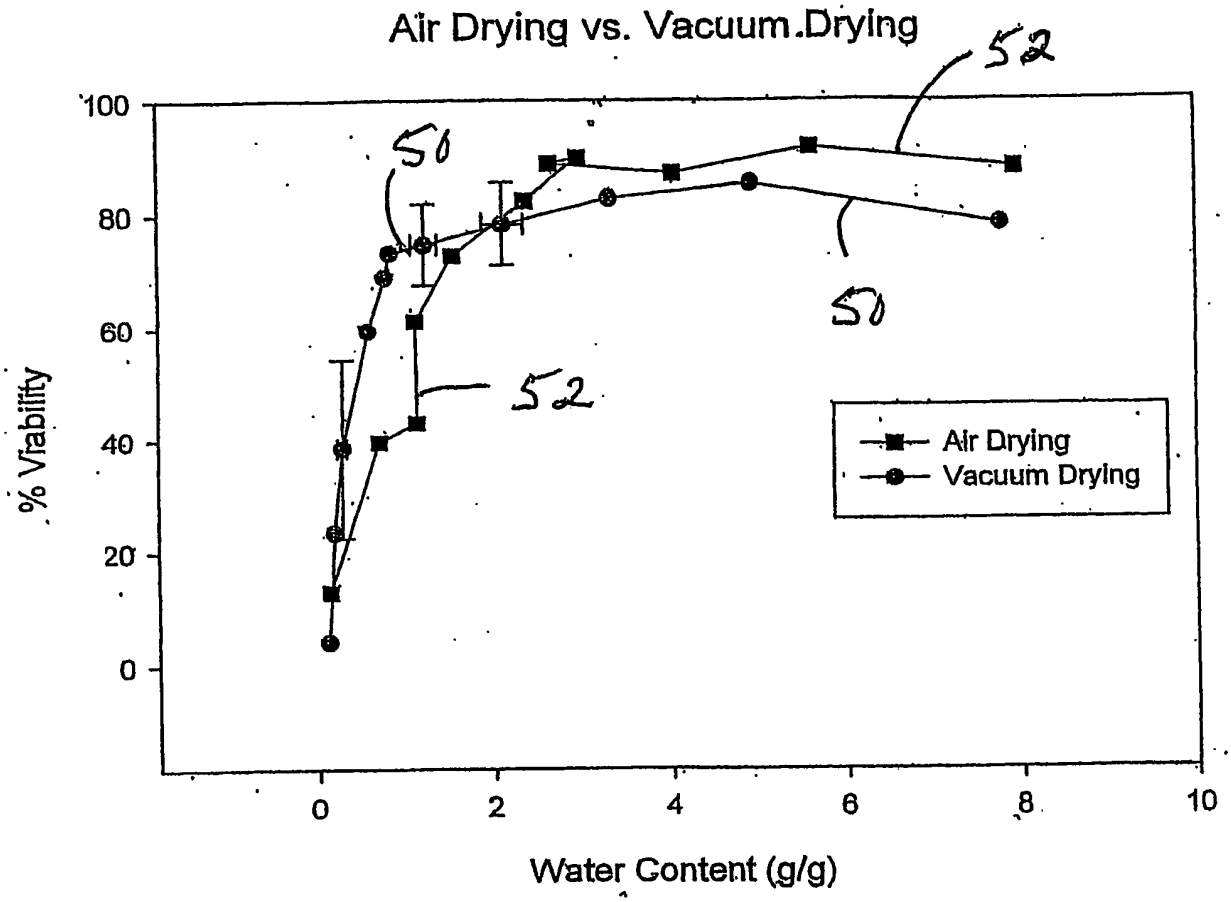
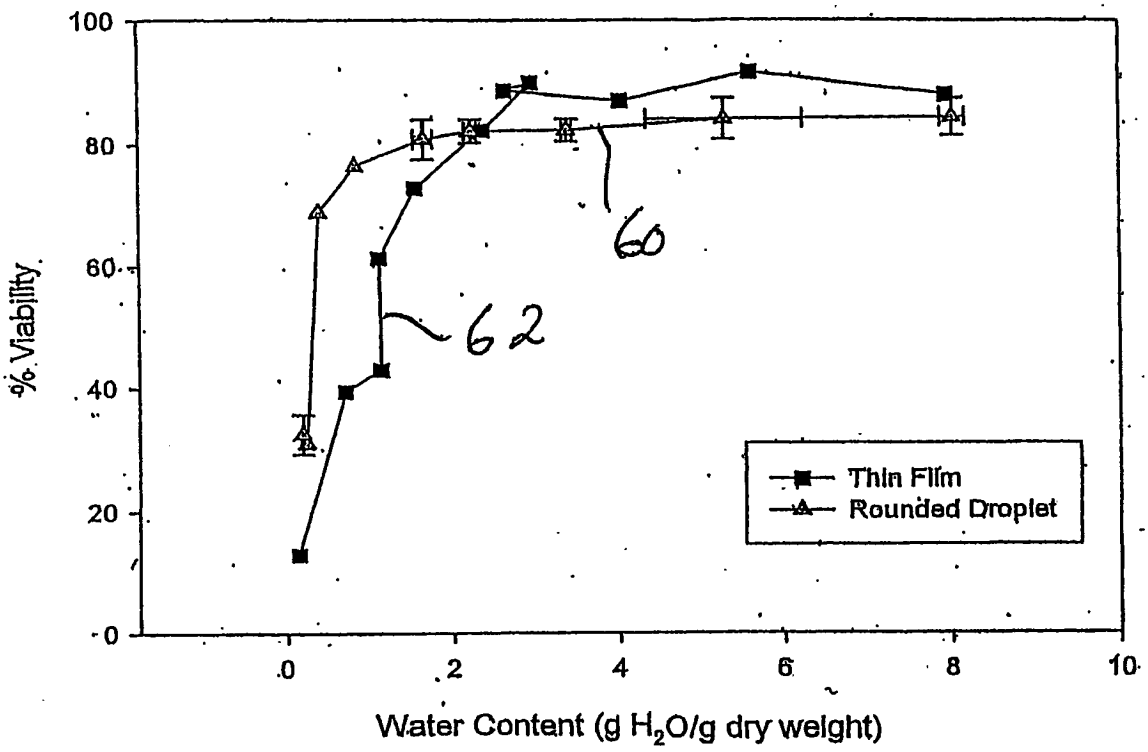


Fig. 6



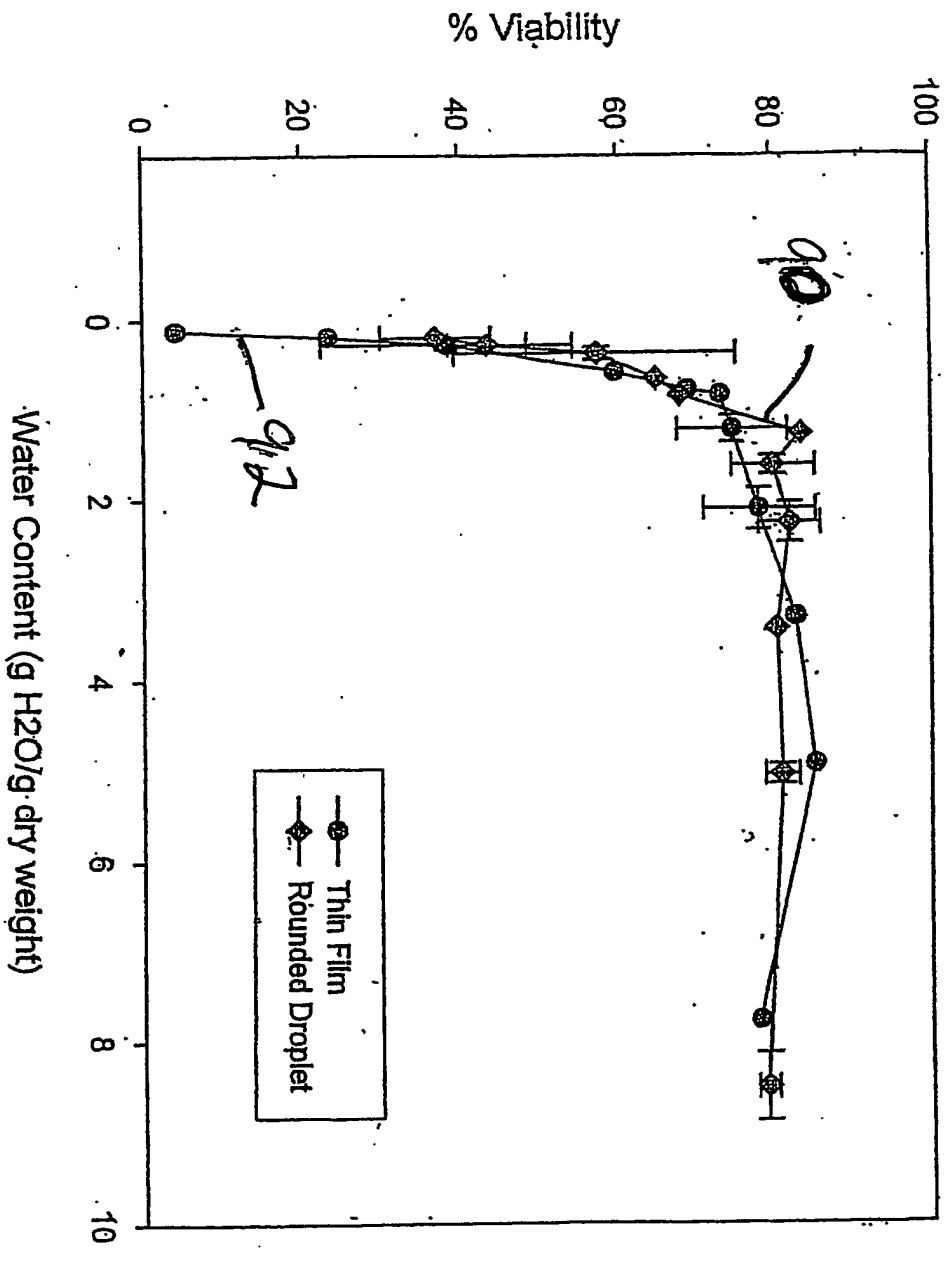


Fig. 7

Fig. 8

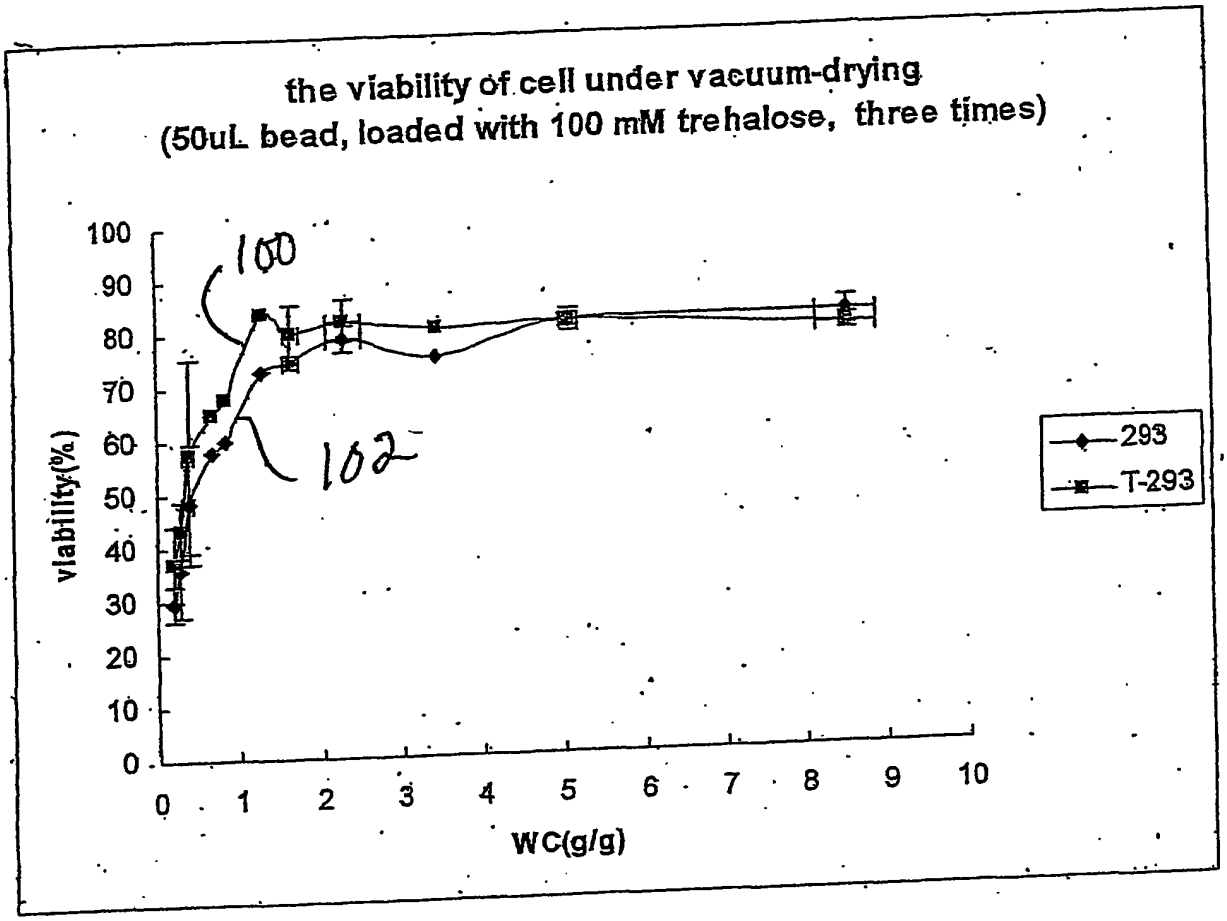
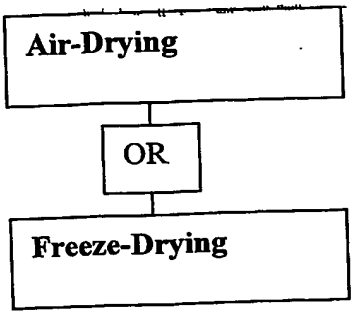


Fig. 9A

Flow Chart for Preserving Nucleated Cells

Nucleated cells in culture	Nucleated cells (e.g. mesenchymal stem cells, 293H cells, HeLa cells, murine B cells, etc.): grow in medium appropriate for cell type) to ~95% confluence.
+/- Adding heat shock protein	Cells are engineered to express p26, from *Artemia*, or other heat shock proteins, (or they are loaded with p26 or other heat shock proteins by endocytosis or protein transporter treatments).
Disaccharide loading	Incubate cells in standard growth medium containing 100 mM disaccharide, e.g., trehalose (or 75 mM for B cells) for 24 h at 37 °C, 5% CO2, and 90% RH.
+/- DMSO treatment	During final hours of disaccharide incubation, add 2% DMSO to the incubation solution to increase the intracellular distribution of disaccharide.
+/- Arbutin or hydroquinone	During disaccharide incubation, include arbutin @ 40 mM and disaccharide at 70 mM.
+/- Apoptosis Inhibitor	During disaccharide incubation, include apotosis inhibitor at 30 μM.
Transfer to drying buffer	Harvest cells by trypsinization. Spin cells gently (<1000 rpm, 10 min) to pellet. Remove supernatant. Resuspend cells in drying buffer (10 mM Hepes, 5 mM KCl, 65 mM NaCl, 150 mM trehalose, and 5.7% BSA with pH 7.2). In case of arbutin- or hydroquinone- containing cells, resuspend in arbutin- or hydroquinone- containing drying buffer (10 mM Hepes, 5 mM KCl, 30 mM NaCl, 150 mM trehalose, 70 mM arbutin or hydroquinone, and 5.7% BSA with pH 7.2).
Vacuum-Drying OR	Samples dried in 50 μL aliquots in the shape of rounded droplets in the caps of Eppendorf microfuge tubes, at room temperature (or in the temperature range of 25 – 42 °C) under a vacuum (pressure ~3 in Hg) to 0.2-0.5 g H_2O/g dry weight. Samples dried in 50 μL aliquots in the shape of rounded droplets in the caps of Eppendorf microfuge tubes (or in 0.5 mL

Fig 9B



aliquots in sterile Petri dishes), at room temperature under a diffuse stream of dry air to 0.2-0.5 g H_2O/g dry weight.

Cell samples dried in a 10-droplet array (where each drop contains a volume of 50 μL) within BioDRI Flasks on a Lyostar shelf style lyophilizer.

Rehydration

Rehydrate the samples in excess growth medium (+/- arbutin; +/- apoptosis inhibitor). Replate the cells (on an adhesive surface, such as collagen, fibronectin, or vinculin), and grow in culture at 37 °C, 5% CO_2, and 90% RH. Use the cells for clinical or in vitro applications, as desired.